

Simple Measurements to Support an Early Assessment of the Performance and Shock Sensitivity of New IM ingredients

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The last few years have seen significant advances in new energetic molecules that may be considered as potential insensitive explosive formulations. These molecules include 1,1-diamino-2,2-dinitroethylene (Fox-7) 3-Nitro-1,2,4-triazol-5-one (NTO), 4,10-dinitro-2,6,8-12-tetraoxa-4,10-diazatetracyclo-[5.5.0.05,903,11]-dodecane (TEX), 2,6-diamino-3,5-dinitropyrazine-1-oxide (LLM-105, PZO) and 3,3' Diaminoazoxy furazan (DAAF) and are of interest to the formulator where both safety and performance are required of the composition. Historically, the trade-off between safety and performance has been met through using mixed explosive compositions, of which PBX-N7 (RDX/TATB/Binder) is perhaps the best known. However, the safety of mixed formulations is always limited by the more sensitive component. This paper discusses the shock sensitivity results of compositions made from LLM-105 and Fox-7 which are compared to PBX-N7. A variation of the gap test has been used in which the acceptor pellets were instrumented with an array of closely spaced ionisation probes. Furthermore, the addition of ionisation probes has made it possible to discern an indication of detonation velocity of the specimens and hence provided useful performance data that will aid selection of these new materials.